REMARKS

I. Introduction

In response to the Office Action mailed on September 13, 2004, no claims have been cancelled, amended or added. Claims 1-23 remain in the application. Re-examination and re-consideration of the application is requested.

II. Prior Art Rejections

In paragraph (3) of the Office Action, claims 1-6, 8, 9, 11-13, and 16-23 were rejected under 35 U.S.C. §102(b) as being anticipated by St. Ville, U.S. Patent No. 5,594,651 (St. Ville). In paragraph (16) of the Office Action, claims 10, 11, 19, and 23 were rejected under 35 U.S.C. §103(a) as being unpatentable over St. Ville in view of Roth, U.S. Patent No. 5,289,567 (Roth). In paragraph (19) of the Office Action, claims 14 and 15 were rejected under 35 U.S.C. §103(a) as being unpatentable over St. Ville in view of Itoh et al., U.S. Patent No. 5,774,124 (Itoh).

Applicants' attorney respectfully traverses the rejections in light of the following arguments.

The present invention concerns the field of integrating FEA functions into a CAD program in order to obtain a unified design environment. An important feature of the present invention as recited in independent claims 1, 16 and 20 is that a graphical function of the CAD program can be used to define a region within a face of a body, the region being used to define a load/support condition for an FEA calculation.

St. Ville (U.S. Patent 5,594,651) discloses a method for manufacturing an object wherein CAD techniques are used and an FEA stress analysis is performed. The teaching of St. Ville primarily concerns the finding of proper materials and manufacturing parameters for obtaining the desired properties of the object. Aspects that concern the present invention, namely the integration of FEA functions into a CAD program, are not mentioned.

In particular, St. Ville does not disclose the feature that a graphical function of the CAD program can be used to define a region within a face of a body, the region being used to define a load/support condition for an FEA calculation.

With respect to this feature, paragraph (4) (b) of the Office Action refers to the following portions of St. Ville:

- graphics software program, Col. 13, Line 56;
- computer-aided design, Col. 13, Line 55 and Col. 1, Line 49;
- region A - F, Fig. 5A;

- step "Identify forces applied to object in intended application" in Fig. 1, Sheet 1/11.

Paragraph (5) of the Office Action further refers to the following portion of St. Ville:

- region, Col. 12, Line 53.

The above portions of St. Ville will now be considered in turn.

The disclosure in Col. 13, Lines 55 - 56 of St. Ville states that a CAD module 801 is a three-dimensional graphics software program for generating a geometrical model definition. However, a geometrical model definition is very different from a load/support condition. An FEA calculation needs both a geometrical model definition and a number of load/support conditions. The geometrical model represents the object on which the various forces defined by the load/support conditions act. The disclosure in Col. 13, Lines 55 - 56 of St. Ville only refers to geometrical models and not to load/support conditions. Presumably the load/support conditions are defined within the FEA software packages mentioned in Col. 14, Lines 18 - 22 without any interaction with the CAD module 801. All in all, Col. 13, Lines 55 - 56 of St. Ville does not disclose the feature that a graphical function of the CAD program can be used to define any entity – let alone a region within a face – that is used to define a load/support condition for an FEA calculation.

Col. 1, Line 46 - 48 of St. Ville teaches that the initial design geometry may be created using CAD techniques. This disclosure refers to step 11 shown in Fig. 1. According to Col. 1, Lines 48 - 50, the forces which will be applied to the object during use, and the points and directions of the respective forces – i.e., the load/support conditions – are identified in step 12 shown in Fig. 1. Step 12 is clearly separate from step 11. There is no disclosure of any use of CAD techniques for performing step 12. Again, neither Col. 1, Lines 46 - 50 nor Fig. 1 of St. Ville disclose that a graphical function of the CAD program can be used to define any entity – let alone a region within a face – that is used to define a load/support condition for an FEA calculation.

Fig. 5A of St. Ville illustrates a force of 2000 N acting on a point of an in vivo hip, i.e., the hip of a living person. Col. 6, Lines 22 - 23 and Col. 8, Lines 35 - 36. This figure has no relevance to the present invention. Fig. 5A, which shows a real-life situation and not a model, does not concern CAD programs or FEA calculations. In contrast to the opinion expressed in the Office Action, elements A - F of Fig. 5A further do not represent regions, but points. Col. 8, Line 38. All in all, Fig. 5A does not show a graphical function of the CAD program, does not show a region, and does not show any definition of a load/support condition for an FEA calculation. If anything, Fig. 5A teaches away from the present invention since the associated table in Fig. 5B defines displacements {x} for the points A - F in a textual and not in a graphical form.

Step 12 of Fig. 1 ("Identify forces applied to object in intended application") has already been discussed above. Again, there is no disclosure that a graphical function of the CAD program was used in step 12 in any way for defining FEA load/support conditions. In fact, St. Ville teaches that the "points and direction of application of the respective forces are identified at step 12". Col. 1, Lines 48 - 50. This disclosure seems to indicate that only forces acting on individual points – and not load/support conditions relating to regions – can be defined in the system of St. Ville.

Col. 12, Lines 53 - 54 of St. Ville discloses that the manufacturing process of a prosthesis can be controlled – by controlling the tightness of the weave of a composite material – to provide a region of high stiffness and a region of low stiffness. Clearly, these regions relate to the finished prosthesis and not to any definition of load/support conditions for an FEA calculation. There is also no disclosure in Col. 12, Lines 53 - 54 that any graphical function of a CAD program was used to define such regions. In this respect, it is remarked that the elements 601, 602, 603 shown in Fig. 6 are certainly not defined by any graphical CAD function. Instead, these elements 601, 602, 603 might possibly be the result of an automatic meshing operation performed by the FEA software. Summing up, the high stiffness region and low stiffness region of the finished prosthesis, as disclosed in Col. 12, Lines 53 - 54 of St. Ville, are not defined by a CAD program and cannot be used to define a load/support condition for an FEA calculation.

Further portions of St. Ville also support the conclusion that St. Ville in fact teaches away from any use of a graphical function of a CAD program to define a region within a face of a body, the region being used to define a load/support condition for an FEA calculation.

According to St. Ville, different programs are employed for the CAD and FEA steps, respectively. Col. 9, Lines 1 - 59. While the FEA software uses the geometric model data generated by the CAD program, there is no indication that any graphical CAD function may be used to define a load/support condition.

St. Ville further states that "the finite element model is completed by specifying the values and/or directions of the above-described fields {f} and potentials {x} at the nodes of the discretized object". Col. 10, Lines 28 - 30. Again, this confirms that (1) the load/support conditions are defined not during the CAD steps on the geometric model data, but during the FEA steps on the finite element model data, (2) no graphical CAD function is used for defining the load/support conditions, and (3) only forces acting on points (and not forces acting on regions within faces) can be defined.

All in all, the disclosure of St. Ville is much farther away from the present invention than, e.g., the functions that have already been available in the prior art "Genius Desktop 3" product, as described on pages 2 and 3 of the present application. Reference is made to our submission of June 25, 2004, for a more detailed description of this prior art and the merits of the present invention.

Roth (U.S. Patent No. 5,289,567) and Itoh (U.S. Patent No. 5,774,124) have only been cited in the Office Action with respect to some of the dependent claims. Both of these documents concern FEA calculations. There is no disclosure in these documents of using graphical CAD functions for defining FEA load/support conditions, let alone for defining a load/support condition that refers to a region within a face of a body processed by a CAD program.

Thus, Applicants submit that independent claims 1, 16, and 20 are allowable over St. Ville, Roth, and Itoh. Further, dependent claims 2-15, 17-19, and 21-23 are submitted to be allowable over St. Ville, Roth, and Itoh in the same manner, because they are dependent on independent claims 1, 16, and 20, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-15, 17-19, and 21-23 recite additional novel elements not shown by St. Ville, Roth, and Itoh.

III. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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